* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to image formation equipments, such as a printer of an electrophotography method, and a copying machine.
[0002]
[Description of the Prior Art] In the image formation equipment of electrophotography methods, such as a printer and a copying machine, in order to carry out amendment control of the concentration fluctuation of the formation image by the environmental variation or aging, the thing equipped with the metering device for measuring the amount of toners adhering to image support is known.
[0003] As a metering device, light is irradiated from the light source to image support, the reflected light from image support is received by the light sensing portion, and what measures the amount of toners which adhered on image support is known.
[0004] This kind of metering device results in dispersing the toner which adhered on image support in order to measure the toner coating weight on image support and to expose the toner holdfast of image support again. This toner that dispersed adheres to the light source and the light sensing portion of a metering device, and has a problem of exact measurement ********.
[0005] Then, in this kind of metering device, optical members, such as cover glass and a lens, are prepared between the toner coating weight detection side of a metering device or a detection side, and image support, and the method of preventing adhesion of the toner to the light source or a light sensing portion is proposed.
[0006]
[Problem(s) to be Solved by the Invention] however, the metering device constituted as mentioned above -- also setting -- the light source -- the toner which dispersed from image support adheres to the optical member prepared in the optical path of a good light sensing portion, and exact measurement becomes difficult.
[0007] Moreover, although the method of preventing adhesion of the toner which impressed bias and dispersed is also proposed to optical members prepared between the toner coating weight detection side of a metering device or a detection side, and image support, such as cover glass and a lens, when impressing high bias, problems, such as adhesion of a toner which carried out reverse electrification, and buildup of the cost by the addition of the power source for bias impression, arise.
[0008]
[Problem(s) to be Solved by the Invention] Then, the object of this invention is an easy and cheap configuration, and is to offer the pixel formation equipment which can prevent degradation of the measurement precision of the toner coating weight by adhesion of a toner.
[0009]
[Means for Solving the Problem] In order to attain the above-mentioned object, according to the image formation equipment of this invention, a measurement means to measure the amount of the developer adhering to image support The above-mentioned image support is equipped with an exposure means to

irradiate light, a light-receiving means to receive the reflected light from image support, and the support means that supported the exposure means and the light-receiving means. The above-mentioned support means It has the floodlighting hole along which the light irradiated from the above-mentioned exposure means passes, and the light-receiving hole along which the above-mentioned reflected light passes, and these floodlighting holes and a light-receiving hole are formed so that spacing of a floodlighting hole and a light-receiving hole may become larger than the die length of the spot produced on the above-mentioned image support by the light irradiated from an exposure means.
[0010] According to other image formation equipments concerning this invention, moreover, a measurement means to measure the amount of the developer adhering to image support An exposure means to irradiate light at the above-mentioned image support, and a light-receiving means to receive the reflected light from image support, The light transmission member arranged between the above-mentioned exposure means and a light-receiving means, and the above-mentioned image support, A preparation, and the above-mentioned image support of the above-mentioned light transmission member and the transparency field which the light irradiated from the above-mentioned exposure means in the opposite front face which counters penetrates, The above-mentioned measurement means is formed so that spacing with the visual field field which can receive the light of the above-mentioned light-receiving means in the above-mentioned opposite front face may become larger than the die length of the spot produced on the above-mentioned image support.
[0011]
[Function] The developer which has adhered on image support is re-exposed in the part of the spot produced by the light irradiated from the exposure means of a measurement means, and disperses towards a measurement means from this spot part. According to the image formation equipment constituted as mentioned above, since [which is] spacing of the floodlighting hole of a measurement means and a light-receiving hole is formed more greatly than the die length of the spot produced on image support, the developer which dispersed from the spot part adheres only to the part between a floodlighting hole and a light-receiving hole, and does not invade in a floodlighting hole and a light-receiving hole. Therefore, it can prevent that the developer which dispersed adheres to an exposure means and a light-receiving means, and it becomes possible to measure the amount of the developer adhering to image support to accuracy over a long period of time with a measurement means.
[0012] Moreover, since spacing of the transparency field and visual field field in the floodlighting side of a light transmission member is formed more greatly than the die length of the spot produced on image support according to other image formation equipments of this invention, the developer which dispersed from the spot part adheres to an opposed face only in the part between these transparency field and a visual field field. Therefore, the detection precision of a measurement means does not deteriorate by adhesion of a developer, and exact measurement is attained over a long period of time.
[0013]
[Example] Hereafter, the example of this invention is explained with reference to a drawing.
[0014] Drawing 1 shows the example which applied the image formation equipment concerning this invention to the color laser beam printer. The photo conductor drum 1 as image support which rotates counterclockwise (the direction of arrow-head A shown in drawing 1) is formed in the abbreviation center section of the body 100 of a color laser beam printer. Around the photo conductor drum 1, sequential arrangement of the electrification machine 2 which is an electrification means, the 1st development counter 4 which is a development means, the 2nd development counter 5, the 3rd development counter 6, the 4th development counter 7, the measuring instrument 8 as a measurement means to measure the coating weight of the toner on the photo conductor drum 1, the imprint drum 9, the front [cleaning] electric discharge machine 10, a cleaner 11, and the electric discharge lamp 12 is carried out.
[0015] The photo conductor drum 1 rotates in the direction of graphic display arrow-head A, and a front face is uniformly charged with the electrification vessel 2. The laser beam light 14 by which outgoing radiation was carried out between the electrification machine 2 and the 1st development counter 4 from the laser beam study system 13 which is an exposure means is irradiated by the front face of the photo

conductor drum 1, and the electrostatic latent image according to image data is formed in the photo conductor drum 1.
[0016] The 1st the 4th development counter 4 thru/or 7 develop the electrostatic latent image on the photo conductor drum 1 corresponding to each color in the toner image of a color, in the 1st development counter 4, cyanogen and the 3rd development counter 6 perform yellow, and, as for a Magenta and the 2nd development counter 5, the 4th development counter 7 develops black.
[0017] On the other hand, the imprint form as imprint material is sent out with the feed roller 16 from a sheet paper cassette 15, and once ready grade is carried out with the resist roller 17, it is sent to the position of the imprint drum 9. And electrostatic adsorption of the imprint form is carried out by the adsorption roller 18 and the adsorption zone electrical machinery 19 at the peripheral face of the imprint drum 9. An imprint form is conveyed in the condition of having stuck to the imprint drum 9, with the revolution of the clockwise rotation (the direction of arrow-head B shown in drawing 1) of the imprint drum 9.
[0018] The toner image on the developed photo conductor drum 1 is imprinted by the imprint form with the imprint electrification vessel 20 in the location where the photo conductor drum 1 and the imprint drum 9 counter. In printing of two or more colors, a development counter is switched for the process which makes one revolution of the imprint drum 9 one period, and the multiplex imprint of the toner image of two or more colors is carried out at a multiple-times deed and an imprint form.
[0019] After the imprint form with which the toner image was imprinted is further conveyed with a revolution of the imprint drum 9 and is discharged with the internal electric discharge machine 21, the external electric discharge machine 22, and the separation electric discharge vessel 23, it exfoliates from the imprint drum 9 with the separation pawl 24. The exfoliative imprint form is conveyed with the conveyance belts 25 and 26 to a fixing assembly 27. The toner on the imprint form heated by the fixing assembly 27 is fused, and it is fixed to an imprint form immediately after discharging from a fixing assembly 27, and the imprint form which ended this fixation is discharged by the tray 28.
[0020] Drawing 2 is the electrification machine of the color laser beam printer which has the above-mentioned configuration, an aligner, a development counter, and the block diagram of the control circuit. The configuration of a color laser beam printer and actuation are further explained to a detail using drawing 2 .
[0021] The photo conductor drum 1 rotates counterclockwise. The electrification machine 2 is mainly constituted by the electrification wire 31, the conductive case 32, and the grid electrode 23. It connects with the high voltage power supply 34 for coronas, and corona discharge of the electrification wire 31 is carried out to the front face of the photo conductor drum 1, and it electrifies this. The grid electrode 33 is connected to the high voltage power supply 35 for grid bias, and the amount of electrifications to the front face of the photo conductor drum 1 is determined by the grid bias electrical potential difference. Moreover, it connects with the control circuit 45 and high voltage power supplies 34 and 35 are having output voltage controlled by this control circuit 45.
[0022] An electrostatic latent image is formed of exposure of the laser beam light 14 by which the front face of the photo conductor drum 1 uniformly charged with the electrification vessel 2 was modulated from the laser beam study system 13. The gradation data buffer 36 stores the external instrument which is not illustrated or the gradation data from a controller, amends the gradation property of a printer, and changes it into laser exposure-time (pulse width) data. By control of a control circuit 45, the laser actuation circuit 37 modulates a laser actuation current (luminescence time amount) according to the laser exposure-time data from the gradation data buffer 36 so that it may synchronize with the scan location of the laser beam light 14. And the semiconductor laser oscillator in the laser beam study system 13 (not shown) is driven according to the modulated laser actuation current. Thereby, a semiconductor laser oscillator carries out luminescence actuation according to exposure-time data.
[0023] Furthermore, the laser actuation circuit 37 compares the output and the set point of the photo detector for monitors (not shown) in the laser beam study system 13, and is performing control which maintains the output quantity of light of a semiconductor laser oscillator at the set point according to an actuation current.

[0024] On the other hand, the pattern generating circuit 38 generates the gradation data of the pattern for a printer independent test pattern and donor coating weight measurement by control of a control circuit 45, and sends them to the laser actuation circuit 37.
[0025] Here, a switch with the laser exposure-time data from the gradation data buffer 36 and the gradation data of the pattern for the toner coating weight measurement from the pattern generating circuit 38 is performed by the control circuit 45, and the data chosen by the control circuit 45 are sent to the laser actuation circuit 37.
[0026] The photo conductor drum 1 on which the electrostatic latent image was formed is developed by the development counter. Although it has four development counters as mentioned above in the color laser beam printer of this example, the case of the 1st development counter 4 is explained here. It is formed by the conductive member and connects with the high voltage power supply 44 for development bias, and the developing roller 43 of the 1st development counter 4 rotates, where development bias voltage is impressed. Thereby, a developing roller 43 makes a toner adhere to the image according to the electrostatic latent image on the photo conductor drum 1. In this way, the toner image in the developed image field is imprinted by the imprint form by which support conveyance is carried out on the imprint drum 9. In addition, the high voltage power supply 44 is connected to the control circuit 45, and development bias voltage is controlled by the control circuit 45.
[0027] a control circuit 45 switches the data sent to the laser actuation circuit 37 synchronizing with the non-image field on the photo conductor drum 1 being alike, and coming to an exposure location and the location which counters to the gradation data outputted from the pattern generating circuit 38 from the laser exposure-time data outputted from the gradation data buffer 36. The gradation pattern for measurement is formed on the photo conductor drum 1 by the gradation pattern for toner coating weight measurement being exposed by the non-image field on the photo conductor drum 1, and developing this exposure section by that cause. If a gradation pattern comes to a measuring instrument 8 and the location where it counters, a measuring instrument 8 will measure the toner coating weight on the photo conductor drum 1. The configuration of this measuring instrument 8 is explained in full detail behind.
[0028] The output (measurement value) of an instrumentation 8 is digitized with A/D converter 46, and is inputted into a control circuit 45. A control circuit 45 compares the reference value of the toner coating weight which is beforehand set up with the output value of a measuring instrument 8, and is memorized by memory 49, and changes at least one, such as a grid bias electrical potential difference of the electrification machine 2 which are image formation conditions, development bias voltage of a development counter 4, light exposure of the laser beam study system 13, toner concentration of a developer, and luminescence time amount of area gradation, according to the comparison result.
[0029] Moreover, a control circuit 45 also performs various control, such as the incorporation of change control of the pattern gradation data for a test pattern the external instrument which is not illustrated or the gradation data from a controller, and printer independent, and toner coating weight measurement, and the output of a measuring instrument 8, control of the output of high voltage power supplies 34, 35, and 44, desired value measurement of a laser actuation current, desired value setting out of toner concentration, toner makeup control, and amendment processing of the gradation property of the printer of gradation data. Furthermore, the memory 49 which can rewrite the content of storage is connected to the control circuit 45, and the reference value of the toner coating weight mentioned above in memory 49 etc. is memorized.
[0030] Next, the configuration and actuation of a measuring instrument 8 are explained with reference to drawing 3 and drawing 4 . A measuring instrument 8 has the box-like body 83 formed with the insulating material, and the support sleeves 50 and 51 of the couple formed with the insulating material are being fixed in this body. A body 83 has bottom wall 83a which kept predetermined spacing in the photo conductor drum 1, and countered it, and the bore of a couple is formed in this bottom wall. An upper bed is blockaded, fitting of the support sleeves 50 and 51 is carried out to a bore, and they are carrying out opening of the soffit toward the photoconductor drum 1, respectively. And soffit opening of the support sleeves 50 and 51 forms the floodlighting hole 84 and the light-receiving hole 85, respectively.

[0031] In the support sleeve 50, the light sources 81, such as LED which acts as an exposure means, are arranged, and this light source is connected to the actuation circuit 91. Moreover, the photoelectrical converter 82 is arranged in the support sleeve 51, and this photoelectrical converter 82 is connected to the propagation circuit 92. And after the light by which outgoing radiation was carried out from the light source 81 carries out incidence to photo conductor drum 1 front face through the floodlighting hole 84 and reflects on photo conductor drum 1 front face, the support sleeves 50 and 51 are arranged at the suitable include angle so that incidence may be carried out to the photoelectrical converter 82 through the light-receiving hole 85.

[0032] The light emitted from the light source 81 is irradiated by the front face of the photo conductor drum 1 through an optical path 86, and is reflected in a detail by the toner which was developed on the front face of the photo conductor drum 1 itself, or the photo conductor drum front face, and adhered. The reflected light reaches the photoelectrical converter 82 through an optical path 86, it is changed into the current according to the quantity of light of the reflected light by this photoelectrical converter 82, and a current / electrical-potential-difference conversion is further carried out. The reflected light from the photo conductor drum 1 changed into the electrical-potential-difference value is transmitted to A/D converter 46 by the propagation circuit 92, is changed into a digital signal here, and is incorporated in a control circuit 45. Moreover, the light source actuation circuit 91 which drives the light source 81 is controlled by the signal which adjusts the amount of currents of on-off control or the actuation current to the light source 81 by the control circuit 45. Next, electrification of the toner adhering to photo conductor drum 1 front face is explained about the case of reversal development using drawing 5 thru/or drawing 7 .

[0033] an electrification location -- a and an exposure location -- e and a cleaning location are set to f and an electric discharge location is set [b and a development location / c and a coating weight measuring point] to g for d and an imprint location. Photo conductor drum 1 front face by which negative electrification was carried out by V0 in the electrification location a is decreased to the exposure section potential VL in the exposure location b, and forms a latent image. In the development location c, it adheres to the toner by which negative electrification was carried out with potential VD to an exposure part. And as for the toner adhering to the photo conductor drum 1, coating weight is measured by the coating weight measuring point d. And the toner on the photo conductor drum 1 is removed in the cleaning location f, and photo conductor drum 1 front face is uniformly discharged with the electric discharge lamp 12 in the electric discharge location g.

[0034] As mentioned above, since toner coating weight measurement measures the toner coating weight after development, the part where the toner has adhered on the photo conductor drum 1 will be re-exposed with a measuring instrument 8, and as shown in drawing 6 and drawing 7 , the potential of the re-exposed part will change to the potential VLS still lower than the surface potential VL which changed with exposure of the laser beam study system 13. For this reason, the developed negative electrification toner comes to move to the part VLS to which potential became low by exposure of the toner coating weight measuring instrument 8 on the photo conductor drum 1 with which potential became low further. Since it adheres to potential with the toner lower than the exposure potential not only by the photo conductor drum 1 top but the laser beam study system which moves at this time, and the part which is floating electrically, potential with the detection side of a measuring instrument 8 lower than the exposure potential by the laser beam study system 13 which counters especially the photo conductor drum 1 and is established, and when it is floating electrically, adhesion of a scattering toner will arise.

[0035] Therefore, in order to prevent that a scattering toner which was mentioned above adheres to the light source 81 and the photoelectrical converter 82 of a measuring instrument 8 according to this example, the measuring instrument is constituted as follows. That is, the potential of the field of the spot formed on the photo conductor drum 1 of the light irradiated from the light source 81 of a measuring instrument 8 on the photo conductor drum 1 falls, and the toner in this spot field disperses. Then, according to this example, as shown in drawing 3 , each part is constituted so that a measuring instrument 8 may become larger than the die length S2 of the spot by which the spacing S1 of the floodlighting hole 84 and the light-receiving hole 85 is formed on the photo conductor drum 1. For

example, while the distance L1 from the light source 81 to the floodlighting hole 84 is set up more greatly than the distance L2 from a floodlighting hole to photo conductor drum 1 front face, also whenever [setting-angle / of the support sleeves 50 and 51] is set as the predetermined include angle, so that the relation of S1>S2 may be filled. In this case, the toner which dispersed from the spot field adheres only to the part between the floodlighting hole 84 and the light-receiving hole 85 in bottom wall 83a of a measuring instrument 8, and can prevent adhesion of the scattering toner to the part on the light source 81, and the photoelectrical converter 82 and its optical path.

[0036] According to the KARAPU cotton linter constituted as mentioned above, it can prevent that the toner which dispersed from the photo conductor drum adheres to the part on the light source and the photoelectrical converter of a measuring instrument, or its optical path by the easy and cheap configuration made larger than the die length of the spot which produces spacing of the floodlighting hole of a measuring instrument 8, and a light-receiving hole in photo conductor drum lifting. Therefore, detection precision does not deteriorate by toner adhesion and the exact measurement of a measuring instrument is attained over a long period of time.

[0037] Drawing 8 shows the measuring instrument of the image formation equipment concerning the 2nd example of this invention. According to this example, in the support sleeve 50 of an instrumentation 8, the condensing member 87 is formed on the optical path 86 of the light irradiated from the light source 81. By condensing the light irradiated from the light source 81 by the condensing member 87, the relation of S1>S2 can be filled easily. Thereby, the toner which disperses from the photo conductor drum 1 can prevent adhering to the light source 81 of a measuring instrument 8, the photoelectrical converter 82, the condensing member 87, and the other members on an optical path 86 like the above-mentioned example. Moreover, by reducing the spot size by the condensing member 87, distance of the light source 81 and the floodlighting hole 84 can be shortened, and the miniaturization of a measuring instrument 8 is attained.

[0038] In addition, although considered as the configuration which obtains the spot of size smaller than the size of the floodlighting hole 84 in the 2nd example by the condensing member 87 which consists of a lens which has a condensing property If it is the optical member which can obtain the spot of size smaller than the size of the spot produced when [which does not prepare a condensing member at all] there is nothing, other optical members, for example, a collimator lens etc., may be used, and the same effectiveness as the 2nd example of the above can be acquired also in this case.

[0039] Drawing 9 shows the measuring instrument of the image formation equipment concerning the 3rd example of this invention. According to the 3rd example, the transparency member 54 which blockades the floodlighting hole 84 and the light-receiving hole 85, for example, cover glass, is attached in the base of the body 83 of a measuring instrument 8. In this case, after it is refracted when incidence of the light by which outgoing radiation was carried out from the light source 81 is carried out to cover glass 54, reaches opposed face 54a which counters the photo conductor drum 1 of cover glass 54 and is refracted again, it reaches a photo conductor drum front face. After dividing exposure light with the floodlighting hole 84 at this time, passing along the inside of a and b in cover glass 54 and carrying out outgoing radiation from cover glass, it passes along the inside of a' which corresponds, respectively, and b', and the spot of die length S2 is irradiated on the photo conductor drum 1.

[0040] On the other hand, with the light-receiving hole 85, the visual field field which is a field of the photoelectrical converter 82 which can be received comes between c and d in cover glass 54, and becomes c' and d' between cover glass and the photo conductor drum 1. Therefore, if a toner adheres on opposed face 54a of cover glass 54 to c as a as a floodlighting field 90, the field between b, and a visual field field 91, and the field between d, the measurement sensibility of a measuring instrument 8 will fall. Therefore, according to this example, the instrumentation 8 is constituted so that the spacing S3 of the floodlighting field 90 and the visual field field 91 on opposed face 54a of cover glass 54 may become larger than the die length S2 of the spot produced on photoconductor drum 1 front face.

[0041] According to the 2nd example of such a configuration, when it has the member which produces refraction like cover glass 54, adhesion of the scattering toner to the floodlighting field 90 and the visual field field 91 of cover glass 54 can be prevented, and lowering of the accuracy of measurement of a

measuring instrument 8 can be prevented.
[0042] In addition, in the 3rd example, the condensing member 87 may be formed like the 2nd example in the optical path of the light source 81, and if the relation of S3>S2 mentioned above is filled also in this case, the same effectiveness as the 2nd and 3rd examples can be acquired.
[0043]
[Effect of the Invention] according to [as explained in full detail above] this invention -- ** in easy -- the image formation equipment which can prevent degradation of the precision of the toner coating weight measurement by adhesion of a scattering toner can be offered by the cheap configuration.

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CLAIMS

[Claim(s)]
[Claim 1] The latent-image means forming which forms a latent image on image support, and a development means to develop with a developer the latent image formed on the above-mentioned image support, It has a measurement means to measure the coating weight of the developer which adhered on the above-mentioned image support. The above-mentioned measurement means It has an exposure means to irradiate light at the above-mentioned image support, a light-receiving means to receive the reflected light from the above-mentioned image support, and the support means that supported the above-mentioned exposure means and the light-receiving means. The above-mentioned support means It has the floodlighting hole along which the light irradiated from the above-mentioned exposure means passes, and the light-receiving hole along which the above-mentioned reflected light passes. The above-mentioned exposure means and a light-receiving means Image formation equipment characterized by being supported by the above-mentioned support means so that spacing of the above-mentioned floodlighting hole and a light-receiving hole may become larger than the die length of the spot produced on the above-mentioned image support by the light irradiated from the above-mentioned exposure means.
[Claim 2] The latent-image means forming which forms a latent image on image support, and a development means to develop with a developer the latent image formed on the above-mentioned image support, It has a measurement means to measure the coating weight of the developer which adhered on the above-mentioned image support. The above-mentioned measurement means An exposure means to irradiate light at the above-mentioned image support, and a light-receiving means to receive the reflected light from the above-mentioned image support, It has the light transmission member arranged between the above-mentioned exposure means and a light-receiving means, and the above-mentioned image support. The above-mentioned exposure means and a light-receiving means The above-mentioned image support of the above-mentioned light transmission member, and the transparency field which the light irradiated from the above-mentioned exposure means in the opposite front face which counters penetrates, Image formation equipment characterized by being arranged so that spacing with the visual field field which can receive the light of the above-mentioned light-receiving means in the above-mentioned opposite front face may become larger than the die length of the spot produced on the above-mentioned image support.
[Claim 3] The above-mentioned measurement means is image formation equipment according to claim 1 or 2 characterized by having a condensing means to condense the light irradiated from the above-mentioned exposure means on the above-mentioned image support.

[Translation done.]